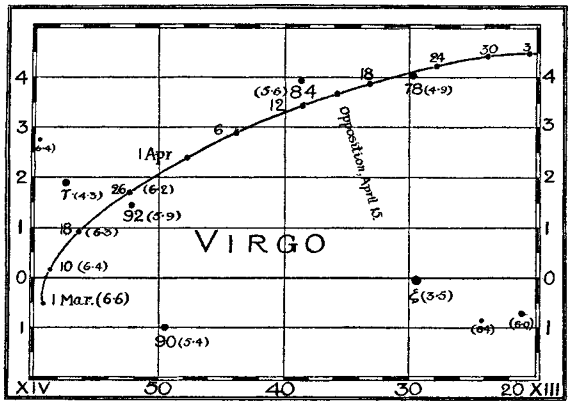
helion, and the apparent stellar magnitude will be 6·2. It will be upwards of four years before a better conditioned opposition takes place. The accompanying chart shows its apparent path. After about March 26 its magnitude does not appreciably alter during the period shown on the chart. The positions of the four stars nearest to the path are corrected for precession. The positions and magnitudes of the stars shown are otherwise taken from the catalogue of naked-eye stars prepared by Mr. T. W. Backhouse. Attention is especially directed to the very close appulse of the planet and the star Flamsteed 78, approximately during the early morning of April 22.

PATH OF THE MINOR PLANET VESTA.



SPECTROSCOPIC OBSERVATIONS OF COMETS 1913*f* (DELAVAN) AND 1914*b* (ZLATINSKY).—N. v. Konkoly has published results of visual spectroscopic observations of these comets made during 1914 (*Astronomische Nachrichten*, No. 4833). The spectra of both were particularly bright, and presented a striking similarity. The sodium D line was seen in the spectrum of Delavan's comet. The mean of a large number of settings on the "bright yellow pearl," as it appeared on September 30, gave λ 589·6. Five hydrocarbon bands were measured in both, the wave-lengths for Delavan's comet on October 17 being 559·54, 543·50, 516·63, 488·38, and 472·38. In Zlatinsky's comet the band at λ 516 was the brightest, the relative intensities, from the red, being 0·5, 0·2, 1·0, 0·4, and 0·3.

AN ATMOSPHERIC EFFECT OF SOLAR KATHODE RAYS.—Reference was made in this column on October 28 to M. J. Maurer's observation of a new atmospheric optical effect synchronising with rapidly increasing solar activity. M. J. Maurer made a more extensive contribution to the *Meteorologische Zeitschrift* on the same subject, and attention is now directed to an English translation of this appearing in the U.S. *Monthly Weather Review* (vol. xliii., No. 11).

MR. IVAN LEVINSTEIN.

THE death, in his seventy-first year, of Mr. Ivan Levinstein, which occurred on March 15, at his residence at Hale, near Manchester, removes a conspicuous figure from the world of industrial chemistry. He went to Manchester about the year 1864 from Berlin, where he had studied chemistry at the Technical High School, and established himself in business in Blackley, in the heart of the dyeing industry of south-east Lancashire, as a manufacturer of aniline dyes, being himself not only his own actual producer, but his own salesman also. He quickly laid the foundations of a flourishing business, and soon began to identify himself conspicuously with the industry and commerce of the city, associating himself also with the active direction of other chemical enterprises like those of the Ammonia Soda Company of Plumbley, and Murgatroyd's Salt Company, of Middlewich. He was the active promoter of the fine chemical exhibit which attracted so much attention at the Manchester Jubilee Exhibition of 1887. He was also the founder and for some time the editor of the *Chemical Review*, one of the first technical journals established in this country. He was twice president of the Society of Chemical Industry, and vice-president of the Society of Dyers and Colourists and of the Manchester Chemical Club. He was for many years a director of the Chamber of Commerce and a past-president, and he was closely identified, for more than thirty years, with the development of the Manchester School of Technology, which owed much to his keen intelligence and sound knowledge of technical matters. The Manchester University, of the Court of which he was a member, awarded him the degree of M.Sc. in recognition of his many services to technical science. His name will always be remembered for his stout advocacy for the reform of the Patent Laws, which gave so unfair an advantage to the foreigner, and he undertook at great personal risk many successful actions against certain of the great German chemical firms in order to compel them to grant licences to manufacturers to work their patents in this country. As he once said, "they had patented the whole field of organic chemistry by their astute method of drafting their patents." His unwearied agitation resulted in the Act of 1907, of which he may truly be said, after efforts which had extended over twenty years, to be the real author.

METHODS AND APPLIANCES FOR THE ATTAINMENT OF HIGH TEMPERATURES IN THE LABORATORY.

WHAT was described as an informal discussion on the above subject was opened by Dr. J. A. Harker, F.R.S., on March 15 at a meeting of the Faraday Society. The meeting, which was presided over by Sir Robert Hadfield, F.R.S., attracted considerable interest, and many well-known experimenters in high-temperature work gave their experiences in the course of the discussion.

Dr. Harker, in the first place, described a recent type of carbon tube furnace at present in use at the National Physical Laboratory for standardising optical pyrometers. It is gratifying to know that the high-resistance, thin-walled carbon tubes employed are now made in this country. For many purposes graphite can be substituted for carbon. This material has the advantage of being easy to tool, but in order to increase its resistance, a spiral or zigzag groove has to be cut along the tubes, and the simple device of wrapping filter paper round the tubes prevents—when nothing but ash remains of the paper—the heat-insulating material from falling through the grooves. For this insulating material Dr. Harker recommends that highly flocculent soot known as paint-maker's lampblack. Finally, the furnace must be completely closed in by a framework of wire-netting coated with cement to form a kind of solid ferro-concrete block. This is necessary on account of the carbon monoxide that is produced, as well as for thermal reasons. Copper bands wrapped round the ends of the tubes as terminals practically complete the furnace, but water-cooling is necessary to prevent undue heating at the contacts to keep down the voltage; indeed, attention to the terminal contacts is a necessary condition of smooth running, and inattention to this is a frequent source

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of avoidable trouble in electric furnace work. The furnace shown in operation at the meeting consumed 100 amperes at 10 volts when running at 2000° C. This temperature was attainable in two or three minutes. A home-made transformer with about 100 primary turns wound in two halves and three separate secondary coils that can be connected in series or parallel enables the furnace to be run off almost any ordinary lighting circuit.

Mr. R. S. Whipple, among other speakers, testified to the value and convenience of this simple form of carbon tube furnace. It was stated that Northrup in America was using a similar furnace on a larger scale for gear hardening in a motor-car factory. A thermocouple is attached to each piece of gear and the temperature is run up until the hump on the curve shows the recalescent point to have passed. The gear is then removed and quenched. One of the furnaces exhibited by Dr. Harker was made for a steel foundry at Sheffield for standardising optical pyrometers, of which a very large number were stated to be in use.

The discussion emphasised the fact that the great desideratum at the present moment for many requirements, both in the laboratory and the works, is a furnace that will have all the advantages of the carbon tube furnace, but which will not evolve carbon compounds. Dr. Rosenhain had used a vacuum furnace wound with tungsten wire for melting pure iron (melting point $1525 \pm 5^\circ$ C.), but the tungsten became brittle after heating, and was soon useless. A resistance furnace using granular tungsten working in hydrogen or nitrogen was suggested as one substitute, and another was a carbon tube furnace with an inner tube and an indifferent gas between the two. It appears, however, that zirconia tubes are being experimented with, and a successful outcome of this work is hopefully anticipated. Zirconia is one of the best refractories known, and if it can be obtained pure in granular form almost any temperature will be possible with surface combustion. Dr. Rosenhain made the useful suggestion to coat carbon electrodes or tubes—even in ordinary commercial electric furnaces—with metallic copper, iron, or aluminium by means of the Schoop spray process, as a means of ensuring good electrical contacts.

For temperatures up to 1000 or 1200° C., tube or muffle furnaces heated with nickel-chromium wire were recommended by several speakers, some of whom have abandoned gas-heating altogether for temperatures below 1000°. On the other hand, some of the modern gas burners, of which several types were described, appear to give excellent results at high temperatures. Air under high pressure is essential, and so it appears is violent mixing of the air and gas —the cause of the great noise made by these furnaces. Mr. S. N. Brayshaw described the ingenious burner which bears his name, which is displacing the oxy-hydrogen flame, too local in its heating, for melting platinum. For many experimental metallurgical purposes the Richmond gas furnace was recommended.

INSECTS IN AFRICA AND THE EAST.

AN accurate description of the Indian lac insect (*Tachardia lacca*), founded on new observations of its life-history and habits, has long been wanted by students of economic entomology. They now find this provided in the recently issued Indian Forest Memoir (Zoology, vol. iii., part 1) by Dr. A. D. Imms and Mr. N. C. Chatterjee. The various stages are illustrated by beautifully executed coloured figures, and there are enumerations of the insect's food-plants and analyses of its important secretion. A remarkable feature is the dimorphism shown in the male, which may be either winged or wingless—the latter condition very rare among Coccidæ. The Tachardia is attacked by an alarming array of enemies, of which the caterpillar of a noctuid moth, *Eublemma amabilis*, is the most formidable. It is aided in its destructive efforts by several other caterpillars of Lepidoptera, a large number of beetles and their larvæ, and a host of hymenopterous parasites.

To the December part (3) of the Bulletin of Entomological Research (vol. vi.) Dr. J. W. Scott Macfie contributes observations on the bionomics of *Stegomyia fasciata*, the mosquito that is well known as the alternate host with man of the yellow fever parasite. The female insect pairs soon after emergence, and then must have a meal of blood before laying her eggs. Fertile eggs may continue to be laid for thirty-seven days without necessity for a second pairing. The prevalent belief that this mosquito sucks blood by night only is not confirmed, "but sometimes she refuses an offer to feed in daylight in favour of the next opportunity to feed in the dark." The male's taste is gentler, as his staple food is honey.

The same part of the Bulletin contains also notes, by Dr. W. A. Lamborn, on the habits of *Glossina morsitans*—the tsetse-fly that carries sleeping-sickness trypanosomes in Nyasaland. The insects are by no means confined to the mapped "fly-belts." The preponderance in number of males among flies captured on the wing, which contrasts with the close equality of the sexes as bred from puparia, is explained by the author as due to the male's habit of pairing as the result of violent capture rather than of courtship; hence the females shun the society of the opposite sex. The slimy secretion of the Glossina larva is believed by Dr. Lamborn to afford some protection against the attacks of certain ants. Puparia are rarely found parasitised by larvæ of Mutilla and other Hymenoptera, and the adult tsetses are sometimes caught and devoured by dragonflies. Dr. Lamborn described how a dragonfly, *Orthetrum chrysostigma*, hovered around his party of six "boys," swooping down and picking off a tsetse from the back of one who stooped to drink at a pool. Many specimens of the Orthetrum were captured in the act of devouring tsetses, which appear to be equally acceptable, whether fasting or filled with freshly-ingested blood, and this species of dragonfly is evidently very expert in catching Glossina. Another kind of dragonfly (*Crocothemis erythraea*), on the other hand, handled a tsetse so clumsily as to convince Dr. Lamborn that it is a novice with this special type of prey. A description with figures of several species of chalcids which Dr. Lamborn has reared from the Glossina puparia is given by Mr. J. Waterston (*t.c.* part 4).

An addition to our knowledge of the distribution of tsetses is contained in Dr. Schweiz's paper in the third part of the bulletin; he has traced *G. morsitans* in the Katanga district of the Belgian Congo far to the west of the great river. Dr. Schwetz writes also on the range and habits of *G. brevipalpis*—a fly often overlooked as it flies before sunrise and after sunset.

G. H. C.

INTERESTING FORAMINIFERA.

IN a fine memoir[1] on Foraminifera from the Kerimba Archipelago, Portuguese East Africa, Messrs. Edward Heron-Allen and Arthur Earland deal with no fewer than 470 species and varieties, of which thirty-two are new to science. There is a striking resemblance between the general facies of the gatherings at Kerimba and that of the late Mr. F W. Millett's collection from the Malay Archipelago. The

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[1] Trans. Zoological Society of London xx (1914), pp. 363–90, 3 pls.; and *Ibid.*, xx. (1915), pp. 543–794, 14 pls., 3 figs. *See also* Proc. Zoological Society of London, 1915, pp. 295–8.

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